Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Original) A nucleic acid encoding a Diphtheria toxin fusion protein comprising

(1) residues 1-388 of Diphtheria toxin, wherein the native furin cleavage site has been substituted for a cleavage site for a matrix metalloproteinase or a plasminogen activator; and

(2) a heterologous polypeptide, wherein the heterologous polypeptide specifically binds to a protein overexpressed on the surface of a cell.

2. (Original) The nucleic acid of claim 1, wherein the matrix metalloproteinase is selected from the group consisting of MMP-2 (gelatinase A), MMP-9 (gelatinase B) and membrane-type1 MMP (MT1-MMP).

3. (Original) The nucleic acid of claim 1, wherein the plasminogen activator is selected from the group consisting of tissue plasminogen activator (t-PA) and urokinase plasminogen activator (u-PA).

4. (Previously Presented) The nucleic acid of claim 1, wherein the matrix metalloproteinase cleavage sites are GPLGMLSQ (SEQ ID NO: 19) and GPLGLWAQ (SEQ ID NO: 20).

5. (Currently Amended) The nucleic acid of claim 1, wherein the plasminogen activator cleavage site is selected from the group consisting of QRGRSA (SEQ ID NO: 23), GSGRSA (SEQ ID NO: 21) and GSGKSA (SEQ ID NO: 22).

6. (Original) The nucleic acid of claim 1, wherein the protein overexpressed on the surface of a cell is a receptor.

7. (Original) The nucleic acid of claim 1, wherein the heterologous polypeptide comprises a cytokine.

8. (Original) The nucleic acid of claim 1, wherein the heterologous polypeptide comprises a growth factor.

9. (Original) The nucleic acid of claim 1, wherein the heterologous polypeptide is a member selected from the group consisting of: Il-2, GM-CSF, and EGF.

10. (Original) The nucleic acid of claim 1, comprising the nucleotide sequence set forth in SEQ ID NO: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, or 13.

11. (Original) A vector comprising the nucleic acid of claim 1.

12. (Original) The nucleic acid of claim 6, wherein the cell is a cancer cell.

13. (Original) The nucleic acid of claim 7, wherein the heterologous polypeptide comprises GM-CSF.

14. (Original) The nucleic acid of claim 7, wherein the heterologous polypeptide comprises IL-2.

15. (Original) The nucleic acid of claim 8, wherein the heterologous polypeptide comprises EGF.

16. (Original) A nucleic acid encoding a Diphtheria toxin fusion protein comprising

(1) residues 1-388 of Diphtheria toxin, wherein the native furin cleavage site has been substituted for a cleavage site for a urokinase a plasminogen activator; and

(2) GM-CSF.

17. (Original) A polypeptide encoded by the nucleic acid of claim 1.

18. (Original) A polypeptide encoded by the nucleic acid of claim 10.

19. (Original) A polypeptide encoded by the nucleic acid of claim 16.

20. (Original) A host cell comprising the vector of claim 11.

21. (Original) The nucleic acid of claim 12, wherein the cancer is leukemia.

22. (Original) The nucleic acid of claim 12, wherein the cancer is acute myelogenous leukemia.

23. (Original) A pharmaceutical composition comprising the protein of claim 18 and a pharmaceutically acceptable carrier.

24. (Original) A method of treating cancer, the method comprising administering to a subject a Diphtheria toxin fusion protein comprising

(1) residues 1-388 of Diphtheria toxin, wherein the native furin cleavage site has been substituted for a cleavage site for a matrix metalloproteinase or a plasminogen activator; and

(2) a heterologous polypeptide, wherein the heterologous polypeptide specifically binds to a protein overexpressed on the surface of a cell.

25. (Original) The method of claim 24, wherein the matrix metalloproteinase is selected from the group consisting of MMP-2 (gelatinase A), MMP-9 (gelatinase B) and membrane-type1 MMP (MT1-MMP).

26. (Original) The method of claim 24, wherein the plasminogen activator is selected from the group consisting of t-PA and u-PA.

27. (Previously Presented) The method of claim 24, wherein the matrix metalloproteinase cleavage sites are GPLGMLSQ (SEQ ID NO: 19) and GPLGLWAQ (SEQ ID NO: 20).

28. (Previously Presented) The method of claim 24, wherein the plasminogen activator cleavage site is selected from the group consisting of QRGRSA (SEQ ID NO: 23), GSGRSA (SEQ ID NO: 21) and GSGKSA (SEQ ID NO: 22).

29. (Original) The method of claim 24, wherein the protein overexpressed on the surface of a cell is a receptor.

30. (Original) The method of claim 24, wherein the cell is a cancer cell.

31. (Original) The method of claim 24, wherein the heterologous polypeptide comprises a cytokine.

32. (Original) The method of claim 24, wherein the heterologous polypeptide comprises a growth factor.

33. (Original) The method of claim 24, wherein the fusion protein is encoded by the nucleotide sequence set forth in SEQ ID NO: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, or 13.

34. (Original) The method of claim 30, wherein the cancer is leukemia.

35. (Original) The method of claim 30, wherein the cancer is acute myelogenous leukemia.

36. (Original) The method of claim 31, wherein the heterologous polypeptide comprises GM-CSF.

37. (Original) The method of claim 31, wherein the heterologous polypeptide comprises IL-2.

38. (Original) The method of claim 32, wherein the heterologous polypeptide comprises EGF.

39. (Original) The method of claim 24, wherein the Diphtheria toxin fusion protein comprises:

(1) residues 1-388 of Diphtheria toxin, wherein the native furin cleavage site has been substituted for a cleavage site for a urokinase plasminogen activator; and

(2) GM-CSF.

40. (Original) A method of targeting a compound to a cell overexpressing a cytokine receptor or a growth factor receptor, the method comprising the steps of:

administering to the cell Diphtheria toxin fusion protein comprising

(1) residues 1-388 of Diphtheria toxin, wherein the native furin cleavage site has been substituted for a cleavage site for a matrix metalloproteinase or a plasminogen activator and wherein the Diphtheria toxin is cleaved by a matrix metalloproteinase or a plasminogen activator; and

(2) a heterologous polypeptide, wherein the heterologous polypeptide specifically binds to a cytokine receptor or a growth factor receptor.

41. (Original) The method of claim 40, wherein the cell also overexpresses a matrix metalloproteinase, a tissue plasminogen activator, or a urokinase plasminogen activator.

42. (Original) The method of claim 40, wherein the matrix metalloproteinase is selected from the group consisting of MMP-2 (gelatinase A), MMP-9 (gelatinase B) and membrane-type1 MMP (MT1-MMP).

43. (Original) The method of claim 40, wherein the plasminogen activator is selected from the group consisting of t-PA and u-PA.

44. (Previously Presented) The method of claim 40, wherein the matrix metalloproteinase cleavage sites are GPLGMLSQ (SEQ ID NO: 19) and GPLGLWAQ SEQ ID NO: 20).

45. (Previously Presented) The method of claim 40, wherein the plasminogen activator cleavage site is selected from the group consisting of QRGRSA (SEQ ID NO: 23), GSGRSA (SEQ ID NO: 21) and GSGKSA (SEQ ID NO: 22).

46. (Original) The method of claim 40, wherein the cancer cell is a leukemia cell.

47. (Original) The method of claim 40, wherein the cancer cell is an acute myelogenous leukemia cell.

48. (Original) The method of claim 40, wherein the Diphtheria toxin fusion protein comprises

(1) residues 1-388 of Diphtheria toxin, wherein the native furin cleavage site has been substituted for a cleavage site for a urokinase plasminogen activator; and

(2) GM-CSF.

49. (Original) An isolated nucleic acid comprising the sequence set forth in any one of SEQ ID NOS: 2-18.